

# THE PHORTICA (S. STR.) FOLIISETA SPECIES-COMPLEX (DIPTERA, DROSOPHILIDAE) FROM CHINA AND ITS ADJACENT COUNTRIES

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**Abstract** Ten species of the *Phortica* (s. str.) *foliiseta* species complex were found from China, Myanmar and Malaysia: *P. foliacea* (Tsacas et Okada); *P. foliiseta* Duda, *P. speculum* (Máca et Lin), *P. afoliolata* Chen et Toda, sp. nov., *P. brachychaeta* Chen et Toda, sp. nov., *P. foliisetoides* Chen et Toda, sp. nov., *P. glabra* Chen et Toda, sp. nov., *P. spinosa* Chen et Gao, sp. nov., *P. symmetria* Chen et Toda, sp. nov. and *P. tanabei* Chen et Toda, sp. nov. A key to all species examined is provided.

**Key words** Diptera, Drosophilidae, *Phortica*, new species, China.

## Introduction

Tsacas and Okada (1983) established the *Phortica* (s. str.) *foliiseta* species complex by four species, of which all the type specimens were collected from New Guinea and Taiwan, China and considered as the “typus” of *Phortica foliiseta* by Duda, 1923. Up to date, this species complex includes six species exclusively distributed in the Oriental Region (Senior White, 1921; Duda, 1923; Takada et al., 1973; Tsacas and Okada, 1983; Máca and Lin, 1993). The diagnosis of this species complex was defined as follows: frons with thick frontal setae; tibiae without black rings; arista plumose in female, apically expanded in male.

We have recently found one species, which should be regarded as a member of the *foliiseta* species complex by the whole morphology, especially the structure of male terminalia. However, the male arista of this species is similar to female: plumose and not expanded apically. In this study we summarized nine species of the *Phortica* (s. str.) *foliiseta* species complex from China and its adjacent countries. Among these species, *Phortica* (s. str.) *speculum* (Máca et Lin, 1993) was found from Shaanxi (south slope of Qinling Mountains) to most of the southern provinces (Guizhou, Sichuan, Yunnan, Hunan, Jiangxi, Fujian, Guangdong, Guangxi and Taiwan) of China, and was also found from Japan (Ryukyu Is.). The remaining species are known only from districts south of the

Hengduan and Nanling Mountains.

The type specimens are deposited in the following institutions: College of Life Science, Peking University (PKU), Beijing, China; Guangdong Institute of Entomology (GIE), Guangzhou, China; Institute for Tropical Biology and Conservation (ITBC), Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia; Kunming Institute of Zoology, Chinese Academy of Sciences (KIZ), Kunming, China; Kinabalu Park, Sabah Parks (KPSP), Sabah, Malaysia; Department of Entomology, South China Agricultural University (SCAU), Guangzhou, China; Systematic Entomology, The Hokkaido University Museum (SEHU), Hokkaido University, Sapporo, Japan. Most of the flies examined were collected around human eyes, and this nature is not mentioned in each description.

About the morphological terminology and the definitions of indices, see Chen and Toda (2001) or Chen and Aotsuka (2003).

## *Phortica* (s. str.) *foliiseta* species complex

*Amiota* (*Phortica*) *foliiseta* species complex, Tsacas et Okada, 1983: 229.

Diagnosis (modified from Tsacas et Okada, 1983). Interfrontal setae thick, dense; additional plate between cerci and 10th sternite absent; paramere short, rod-shaped, basally usually recurved and with a few sensilla, apically always knobbed (Figs. 3-4, 8, 12-13, 22-23, 27-28, 32).

Description. Eyes brownish red. Ocellar triangle

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brown to black. Frons grayish to dark brown. Frontoorbital plate silvery white. Pedicel and first flagellomere almost grayish yellow. Face grayish yellow to dark brown, with yellowish white patches on lower corners. Clypeus medially white, laterally black. Gena grayish brown; postgena dark brown. Palpus somewhat triangular, grayish yellow distally, brown basally, with one hollow sense organ subapically and a few setae distally. Vibrissa prominent; other orals small. Occiput glossy, brownish black.

Thorax orange brown, usually with brownish to black patches and pollinose pattern. Postpronotal lobe pale yellow, with one long and three to five short setae. Acrostichal setulae in about 10 irregular rows. Prescutellar setae present. Scutellum usually concolorous with thorax. Basal scutellar setae divergent; apical scutellars cruciate.

Wing hyaline; veins grayish yellow. Basal medial cubital crossvein present;  $C_1$  setae two, less differentiated. Costal vein with spinules on ventral surface between  $R_{2+3}$  and  $R_{4+5}$ .  $R_{2+3}$  slightly curved to costa at tip;  $R_{4+5}$  distally convergent with  $M_1$ . Halteres white.

Legs yellow; male tibiae almost without dark spots or rings; female with dark spots submedially on all femora and dark ring(s) apically on all tibiae. Foreleg femur with two to three irregular rows of long setae on posterior surface. Preapical dorsal setae present on all tibiae. Midleg tarsus ventrally with two rows of minute cuneiform setulae on inner and outer sides; hindleg tarsus with one row of such setulae on underside; fore and hindleg first tarsomeres each as long as three succeeding tarsomeres together; midleg first tarsomere as long as other tarsomeres combined.

Abdominal tergites yellow, with broad, brownish black, posterior bands interrupted medially. Sternites usually grayish yellow.

Male terminalia. Epandrium mid-dorsally constricted, laterally broad, nearly entirely pubescent, with dense setae. Surstylus mostly covered with epandrium. Cercus narrow, separated from epandrium, entirely pubescent and setigerous. Membrane between epandrium and cercus pubescent. Hypandrium arched, apically round; posterior ends contiguous to posterolateral corners of gonopods and anteroventral corners of epandrium. Gonopods fused to each other, forming posteromedian plate, anteriorly forming vertical process. Parameres usually basally contiguous to anterior portion of hypandrium and tips of distally bifurcated aedeagal guide. Aedeagal outer membranous

tube developed, posteriorly connected to vertical process of gonopods; aedeagal median rod usually undeveloped (Figs. 3-4, 12-13, 23, 32), sometimes absent (Figs. 8, 18-19, 27-28).

Included species: *P. foliacea* (Tsacas et Okada, 1983); *P. foliiseta* Duda, 1923; *P. nigrifoliiseta* (Takada, Momma et Shima, 1973); *P. phyllochaeta* (Tsacas et Okada, 1983); *P. speculum* (Máca and Lin, 1993); *P. xyleboriphaga* Senior-White, 1921; *P. afoliolata* Chen et Toda, sp. nov.; *P. brachychaeta* Chen et Toda, sp. nov.; *P. foliisetoides* Chen et Toda, sp. nov.; *P. glabra* Chen et Toda, sp. nov.; *P. spinosa* Chen et Gao, sp. nov.; *P. symmetria* Chen et Toda, sp. nov.; *P. tanabei* Chen et Toda, sp. nov.

#### *Phortica foliacea* (Tsacas et Okada)

*Amiota* (*Phortica*) *foliacea* Tsacas et Okada, 1983: 232.

Specimens examined. China, 3 ♂♂, Taiwan, Shanlinxi (23°42' N, 120°50' E), 16 Oct. 1992, Toda Masanori J.

Distribution. China (Taiwan).

#### *Phortica foliiseta* Duda

*Phortica foliiseta* Duda, 1923: 35.

*Amiota* (*Phortica*) *foliiseta* Tsacas et Okada, 1983: 230; Okada, 1988: 120.

Specimens examined. China, 1 ♂, Guangdong, Zhaoqing, Dinghushan (23°10' N, 112°34' E), 4-10 Mar. 1987, ex banana trap, PENG Tong-Xu; 1 ♂, Guangdong, Longmen, Nankunshan (23°38' N, 114°38' E; alt. 700 m), 4 Apr. 2004, CHEN Hong-Wei.

Distribution. China (Taiwan, Guangdong); Thailand, Sri Lanka.

#### *Phortica speculum* (Máca et Lin)

*Amiota* (*Phortica*) *speculum* Máca et Lin, 1993: 172.

Specimen examined. China, 1 ♂ A type, 2 ♂♂ B type, Shaanxi, Foping (32°32' N, 107°41' E; alt. 1 000 m), 5, 6 Aug. 2003, GAO Jiar-Jun; 1 ♂ A type, Hunan, Sangzhi, Badagongshan (28°25' N, 109°54' E; alt. 700 m), 7 Sep. 2000, Takamori Hisaki; 4 ♂♂ A type, 3 ♂♂ B type, Jiangxi, Yifeng, Guanshan (28°33' N, 114°57' E; alt. 700 m), 8-10 June 2004, GAO Jiar-Jun and CHEN Hong-Wei; 1 ♂ A type, 1 ♂ B type, Fujian, Wuyishan (27°43' N, 117°58' E; alt. 700 m), 19 Aug. 2000, CHEN Hong-Wei; 4 ♂♂ A type, 3 ♂♂ B type, Jiangxi, Yanshan (27°43' N, 117°57' E; alt. 1 000 m), 14 June 2004, GAO Jiar-Jun and CHEN Hong-Wei; 1 ♂ A type, 2 ♂♂ B type, Guangdong,

Luyuan, Nanling ( $25^{\circ}10' N$ ,  $113^{\circ} E$ ; alt. 1 000 m), 2-5 May 2004, CHEN Hong Wei; 4 ♂♂ A-type, Guangxi, Guilin, Maershan ( $25^{\circ}51' N$ ,  $110^{\circ}27' E$ ; alt. 700 m), 19 Oct. 2004, CHEN Hong Wei; Guizhou, Anshun, Longgong ( $26^{\circ}05' N$ ,  $105^{\circ}58' E$ ; alt. 700 m), 2 ♂♂ A-type, 2 Feb 24 Aug. 2000, GAO Jian Jun; 5 ♂♂ B-type, 24 Sep. 2002, GAO Jian Jun and WANG Bao Cheng; 1 ♂ A-type, Sichuan, Emeishan ( $30^{\circ}41' N$ ,  $102^{\circ}30' E$ ; alt. 550 m), 18 July 1992, Toda Masanori J.; 2 ♂♂ A-type, 3 ♂♂ B-type, Yunnan, Simao, Yixiang ( $22^{\circ}47' N$ ,  $101^{\circ}02' E$ ; alt. 1 200 m), 15 Sep. 2002, WANG Bao Cheng and CHEN Hong Wei. Japan, Ryukyu Is., Iriomote: 1 ♂ B-type, 25 Nov. - 2 Dec. 1994, 1 ♀, 30 Dec. 1994-9 Jan. 1995, 1 ♀, 9-15 Mar. 1995, 2 ♀♀, 22-30 Mar. 1995, ex banana trap, Kimura Masahito T.

Remarks. As described by Máca and Lin (1993), there is a mirror-image variation in the asymmetric structure of the vertical process of gonopods: A-type (including the holotype) having two left and one right anterolateral projections, but B-type *vice versa*.

Distribution. China (Shaanxi, Jiangxi, Fujian, Taiwan, Guangdong, Guangxi, Guizhou, Sichuan, Yunnan), Japan (Ryukyu Is.).

*Phortica afoliolata* Chen et Toda, sp. nov.



Figs. 1-4. *Phortica afoliolata* Chen et Toda, sp. nov. ♂. 1. Epandrium and cercus (lateral view). 2. Surstylus (inner view). 3. Hypandrium, parameres, aedeagus and gonopods (ventral view). 4. Hypandrium, parameres, aedeagus and gonopods (lateral view). Scale bars = 0.1 mm.

Measurements. BL = 3.13 mm in the holotype (range in 4 ♂♂ and 3 ♀♀, paratypes: 2.60-3.32 mm in ♂♂, 3.44-3.69 mm in ♀♀), ThL = 1.56 mm (1.40-1.60 mm in ♂♂, 1.56-1.72 mm in ♀♀), WL = 2.19 mm (2.00-2.40 mm in ♂♂, 2.32-2.64 mm in ♀♀), WW = 1.12 mm (0.92-1.12 mm in ♂♂, 1.16-1.20 mm in ♀♀).

(Figs. 1-4)

Diagnosis. Vertical process of gonopods nearly symmetric, slightly sclerotized and with two small, sclerotized projections on apical margin (Figs. 3-4); aedeagal median rod separated into two small, deeply bifurcated sclerites (Figs. 3-4).

Description. Male arista plumose, apically not expanded.

Legs with dark spots submedially on all femora; all tibiae with two dark rings.

Third to fifth abdominal sternites longer than wide, without long setae laterally; sixth sternite with a few long setae laterally.

Male terminalia. Surstylus with numerous setae, pubescence and about eight prenisetae on ventral margin to inner surface (Fig. 2). Paramere apically strongly sclerotized, knobbed and smooth, basally to submedially with about three sensilla (Figs. 3-4).

Female terminalia. Seventh tergite not separated mid-dorsally. Eighth sternite (oviscapt) large, not bilobed, basally broadened. Pregenital lamella slightly sclerotized, triangle, posteriorly contiguous to eighth sternite. Spermatheca dark brown, duct introverted into capsule.

Indices. arb = 5.6/3 (4.6/3.5), avd = 0.56 (0.50-0.59), adf = 1.20 (1.10-1.20), flw = 1.40 (1.20-1.50), FW/HW = 0.45 (0.40-0.45), ch/o = 0.08 (0.07-0.08), pror = 1.25 (1.20-1.40), rcorb = 0.70 (0.55-0.80), vb = 0.50 (0.35-0.50), dcl = 0.60 (0.50-0.60), prescl = 0.60 (0.50-0.65), scl = 1.10 (1.00-1.15), sterno = 1.00

(1.00), orbito = 2.00 (1.80-2.00), dcp = 0.22 (0.23-0.25), sctlp = 1.20 (1.20-1.30), C = 2.00 (1.94-2.13), 4c = 1.56 (1.60-2.11), 4v = 2.56 (2.70-3.44), 5x = 1.17 (1.14-1.17), ac = 3.50 (3.16-4.00), M = 0.78 (0.70-0.88), C3F = 0.57 (0.57-0.68).

Holotype ♂, China, Hainan, Ledong, Jianfeng (23°10' N, 112°34' E; alt. 220 m), 18 May 2004, CHEN Hong Wei (SCAU).

Paratypes. China, 2 ♂♂, same data as holotype except for 20 May 2004 (SCAU); 6 ♂♂, same data as holotype except for 21, 25 Sep. 1993, Toda Masanori J. (3 ♂♂, GIE; 3 ♂♂, SEHU); 1 ♂, Hainan, Lingshui, Diaoluoshan (23°10' N, 112°34' E; alt. 300 m), 24 May 2004, CHEN Hong Wei (PKU); 3 ♂♂, Yunnan, Xishuangbanna, Menglun (21°41' N, 101°25' E; alt. 900 m), 21-23 Sep. 2003, WEN Shuo Yang and CHEN Hong Wei (1 ♂, KIZ; 2 ♂♂, SCAU). Myanmar, 1 ♂, 3 ♀♀, Yarr gon, 10, 14 June 1982, Toda Masanori J. (SEHU).

Distribution. China (Hainan, Yunnan), Myanmar (Yangon).

Relationship. This species can be easily separated from the other species of the *foliolata* species complex by the male arista apically not expanded as leaf.

Etymology. A combination of the Latin words: “α” + “foliolatus”, referring to the lack of leaf-like expansion at the tip of male arista.

*Phortica brachychaeta* Chen et Toda, sp. nov. (Figs. 5-8)

Diagnosis. All projections of vertical process of gonopods strongly sclerotized and apically pointed; left

(A type) or right (B type), lateral lobe on vertical process of gonopods deeply bifurcated (Fig. 8).

Description. Male. Arista apically expanded, without dorsal branches (Fig. 5).

All tibiae without dark rings; foreleg fifth tarsomere with one long seta apically.

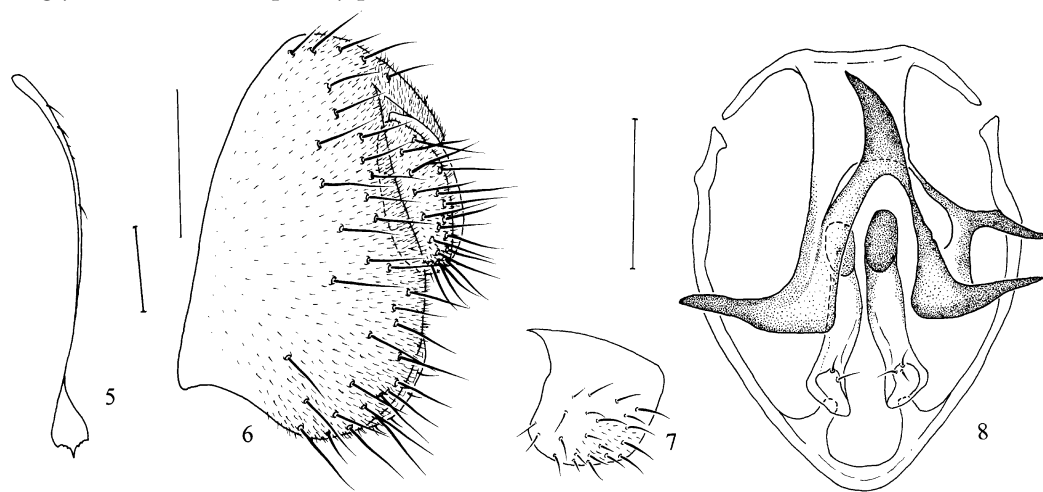
Third abdominal sternite much broadened, with several long setae laterally.

Male terminalia. Surstylus with numerous setae and pubescence, lacking prensisetae (Fig. 7). Paramere apically roundly knobbed and finely serrated, basally with two sensilla (Fig. 8). Vertical process of gonopods asymmetrically triangular. Aedeagus lacking median rod.

Measurements. BL = 3.20 mm in the holotype (range in 4 ♂♂, paratypes: 3.00-3.38 mm), ThL = 1.10 mm (1.10-1.30 mm), WL = 2.20 mm (2.20-2.30 mm), WW = 1.00 mm (1.00-1.10 mm).

Indices. arb = 0/0, flw = 1.10 (1.10-1.20), FW/HW = 0.45 (0.45-0.50), ch/o = 0.07 (0.07-0.08), prarb = 1.50 (1.48-1.63), rcarb = 0.55 (0.48-0.60), vb = 0.50 (0.50), dcl = 0.55 (0.50-0.55), presctl = 0.55 (0.50-0.65), sctl = 1.00 (1.00-1.10), sterno = 1.00 (1.00), orbito = 1.90 (1.83-1.95), dcp = 0.23 (0.23-0.25), sctlp = 1.25 (1.20-1.25), C = 2.35 (2.23-2.38), 4c = 1.63 (1.62-1.67), 4v = 3.20 (3.10-3.35), 5x = 1.21 (1.20-1.37), ac = 3.27 (3.10-3.57), M = 0.85 (0.80-0.91), C3F = 0.60 (0.63-0.75).

Holotype ♂, B type, China, Yunnan, Xishuangbanna, Menglun (21°41' N, 101°25' E; alt. 900 m), 24 Dec. 2004, WEN Shuo Yang (SCAU).



Figs 5-8. *Phortica brachychaeta* Chen et Toda, sp. nov. ♂ (B type). 5. Arista. 6. Epandrium and cercus (lateral view). 7. Surstylus (inner view). 8. Hypandrium, parameres and gonopods (ventral view). Scale bars = 0.1 mm.

Paratypes. China, 2 ♂♂ B-type, Guangdong, Zhaoqing, Dinghushan (23°10' N, 112°34' E), 23

Aug. -6 Sep. 1988, ex banana traps, PENG Tong Xu (GIE); 1 ♂A type, Yunnan, Simao, Manxi (22°47' N, 101°02' E), 10 Oct. 2001, Watabe Hide-Aki (KIZ); 1 ♂B type, same data as holotype except for alt. 570 m, ? May 1985, LIANG Xing-Cai (KIZ); 9 ♂♂ B type, same data as holotype except for 8 Mar. 2003, 24-26 Dec. 2003, Toda Masanori J., WEN Shuo-Yang and CHEN Hong-Wei (2 ♂♂, PKU; 4 ♂♂, SCAU; 3 ♂♂, SEHU).

Distribution. China (Guangdong, Yunnan).

Relationship. This species is very similar to *P. speculum* in the male terminalia, but different from the latter in the arista and the shape of vertical process of gonopods (in *P. speculum*: arista basally with two dorsal branches; projections of vertical process of gonopods, especially median one, apically blunt).

Remarks. As *P. speculum*, this species has a mirror-image variation in the asymmetric structure of the vertical process of gonopods: B-type (including the holotype) having two right and one left anterolateral

projections, but A type *vice versa*.

**Etymology.** A combination of the Greek words: "brachys" + "chaeta", meaning short setae, referring to the arista with short setae only.

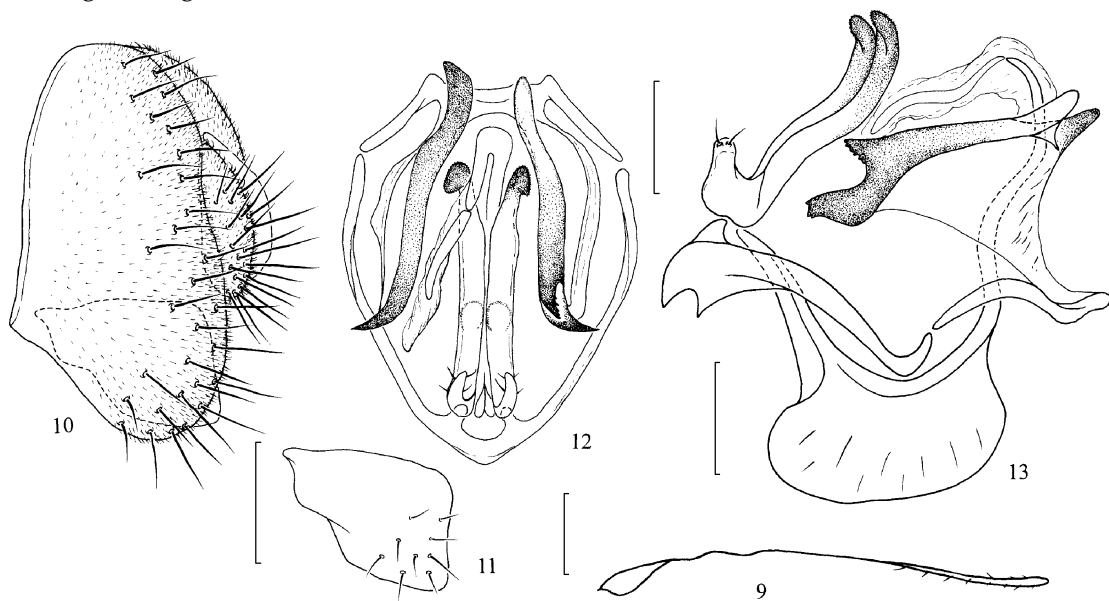
*Phortica foliisetoides* Chen et Toda, sp. nov.  
(Figs. 9-13)

**Diagnosis.** Vertical process of gonopods strongly sclerotized; anterior projection on right, lateral lobe of vertical process apically bifurcated (Figs. 12-13).

**Description.** Male. Arista apically expanded, without dorsal branches (Fig. 9).

All tibiae without dark rings; foreleg fifth tarsomere with one long seta apically.

Third abdominal sternite distinctly broadened, shorter than wide, with several long setae laterally; fourth sternite slightly longer than wide; fifth sternite longer than wide; sixth sternite without long setae laterally.



Figs 9-13. *Phortica foliisetoides* Chen et Toda, sp. nov. ♂. 9. Arista. 10. Epandrium and cercus (lateral view). 11. Surstylus (inner view). 12. Hypandrium, parameres and gonopods (ventral view). 13. Hypandrium, parameres, aedeagus and gonopods (lateral view). Scale bars= 0.1 mm.

**Male terminalia.** Surstylus with several setae, lacking pubescence and prensisetae (Fig. 11). Paramere longer, apically roundly knobbed and finely serrated, basally with two to four sensilla (Figs. 12-13). Gonopods basolateral processes on right lateral lobe slightly serrated on apical margin (Figs. 12-13). Aedeagus with small median rod.

**Measurements.** BL= 2.40 mm in the holotype (range in 4 ♂♂ paratypes: 2.48-2.72 mm), ThL= 1.12 mm (1.16-1.28 mm), WL= 1.84 mm (1.80-

2.00 mm), WW= 0.88 mm (0.84-0.96 mm).

**Indices.** arb = 0/0, flw = 1.20 (1.00-1.20), FW/HW = 0.40 (0.35-0.40), ch/o = 0.07 (0.06-0.07), prarb = 1.25 (1.35-1.40), rcarb = 0.60 (0.60-0.80), vb = 0.40 (0.40-0.45), dcl = 0.60 (0.55-0.60), prescl = 0.60 (0.60-0.65), scl = 1.10 (1.00-1.15), sterno = 1.00 (1.00), orbito = 1.80 (1.90-2.00), dcp = 0.25 (0.24-0.25), scltp = 1.10 (1.00-1.15), C = 1.86 (1.67-1.80), 4c = 2.00 (1.86-2.00), 4v = 3.14 (3.00-3.14), 5x =

1.00 (1.20),  $ac = 3.50$  (3.50-3.75),  $M = 0.71$  (0.75-0.86),  $C3F = 0.57$  (0.50-0.53).

Holotype ♂, China, Hainan, Ledong, Jianfeng (18°41' N, 108°52' E; alt. 200 m), 20 May 2004, CHEN Hong Wei (SCAU).

Paratypes. China, 5 ♂♂, same data as holotype except for 20, 21 May 2004 (2 ♂♂, PKU; 3 ♂♂, SCAU); 8 ♂♂, same data as holotype except for 21, 22 Sep. 1992, Toda Masanori J. (4 ♂♂, GIE; 4 ♂♂, SEHU).

Distribution. China (Hainan).

Relationship. This species is very similar to *P. foliiseta* in the shape of gonopods, but can be distinguished from the latter species by the diagnostic characters (in *P. foliiseta*: arista basally with 1-2 distinct, dorsal branches; vertical process of gonopods sclerotized only apically, and anterior projection on right, lateral lobe of vertical process not bifurcated).

Etymology. In reference to this species similar to *P. foliiseta*.

*Phortica glabra* Chen et Toda, sp. nov.

(Figs. 14-18)

Diagnosis. Hypandrium, parameres and vertical process of gonopods asymmetric (Figs. 17-18); vertical process of gonopods anterolaterally lacking projection on right side, but with three long, strongly sclerotized projections on left side (Figs. 17-18).

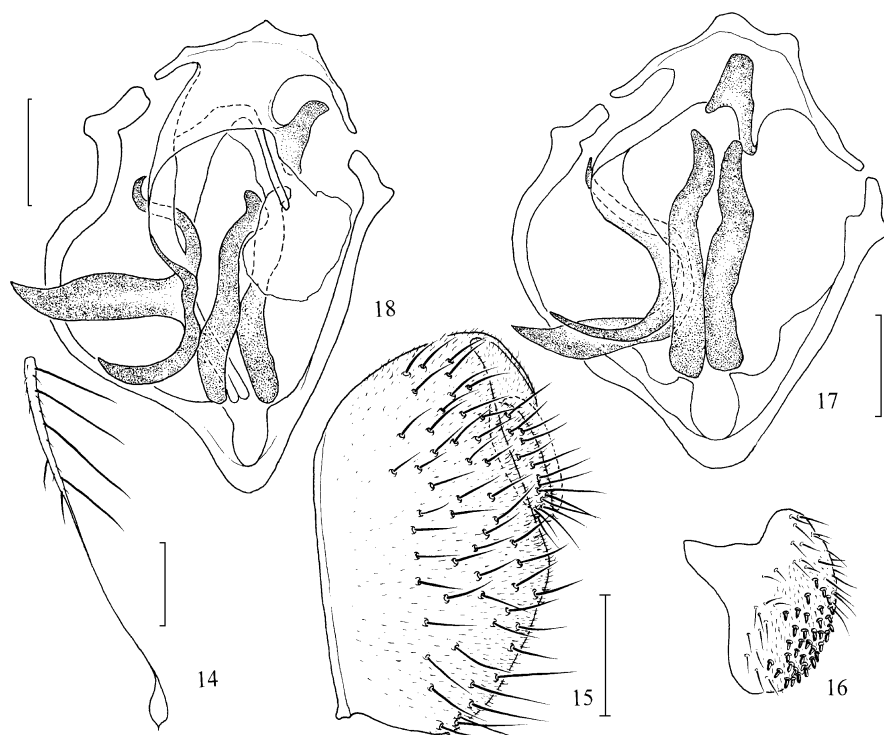
Description. Male. Arista apically expanded, basally with two to four long dorsal and one to two short ventral branches (Fig. 14).

All tibiae without dark rings; foreleg fifth tarsomere with one long seta apically.

Third abdominal sternite broadened, shorter than wide, with several long setae laterally.

Male terminalia. Surstylus with numerous setae, pubescence and prenisetae (Fig. 16). Paramere long, apically slightly knobbed and finely serrated, basally neither recurved nor bearing sensilla (Figs. 17-18). Aedeagus lacking median rod.

Measurements. BL = 3.84 mm in the holotype (range in 4 ♂♂ paratypes: 3.3-4.00 mm), ThL = 1.85 mm (1.76-1.88 mm), WL = 2.00 mm (2.00-2.12 mm), WW = 0.92 mm (0.92-1.00 mm).



Figs. 14-18. *Phortica glabra* Chen et Toda, sp. nov. ♂. 14. Arista. 15. Epandrium and cercus (lateral view). 16. Surstylus (inner view). 17. Hypandrium, parameres and gonopods (ventral view). 18. Hypandrium, parameres, aedeagus and gonopods (ventrolateral view). Scale bars = 0.1 mm.

Indices.  $arb = 3/1$  (2-4/1-2),  $FW/HW = 0.45$  (0.43-0.48),  $ch/o = 0.10$  (0.09-0.17),  $prorb = 1.30$  (1.22-1.34),  $rcorb = 0.57$  (0.58-0.67),  $vb = 0.45$  (0.40-0.50),  $dcl = 0.55$  (0.53-0.60),  $presctl$

$= 0.58$  (0.56-0.64),  $sctl = 0.94$  (0.92-0.99),  $sterno = 1.00$  (0.92-1.00),  $orbito = 1.80$  (1.70-1.80),  $dcp = 0.28$  (0.25),  $sctlp = 1.20$  (1.15-1.20),  $C = 2.25$  (2.45-2.53),  $4c = 1.68$  (1.39-1.51),  $4v =$

3.28 (2.76-3.11),  $5x = 0.96$  (0.85-0.95),  $ac = 3.30$  (3.19-3.50),  $M = 0.77$  (0.62-0.80),  $C3F = 0.79$  (0.62-0.71).

Holotype ♂, China, Guangdong, Luyuan, Narring (25°10' N, 113°00' E; alt. 1 000 m), 2 May 2004, CHEN Hong Wei (SCAU).

Paratypes. China, 20 ♂♂, same data as holotype (5 ♂♂, KIZ; 5 ♂♂, PKU; 5 ♂♂, SCAU, 5 ♂♂, SEHU); 2 ♂♂ same data as holotype except for 23 Aug. 2002, Takamori Hisaki (SCAU); 5 ♂♂, Guangdong Zhaoqing, Dinghushan (23°10' N, 112°34' E, alt. 500 m), 1 ♂, 24 Apr.-4 May 1988, 1 ♂, 19-26 Sep. 1988, 1 ♂, 17-23 Oct. 1988, 1 ♂, 3 Nov. 1988, 1 ♂, 22 Nov. 1989, *ex* banana traps, PENA Tong Xu (GIE); 4 ♂♂, Guangdong, Longmen, Nankunshan (23°38' N, 114°38' E; alt. 700 m), 4 Apr. 2004, CHEN Hong Wei (SCAU); 4 ♂♂, Guangdong, Yingde, Shimentai (24°25' N, 113°17' E; alt. 700 m), 9-10 Apr. 2004, CHEN Hong Wei (SCAU).

Distribution. China (Guangdong).

Relationship. This species can be easily distinguished from the other known species in this complex by the asymmetric hypandrium and parameres.

Etymology. From the Latin word "*glabellus*", meaning lacking setae, referring to the paramere lacking sensilla.

*Phortica spinosa* CHEN et Gao, *sp. nov.* (Figs. 19-23)

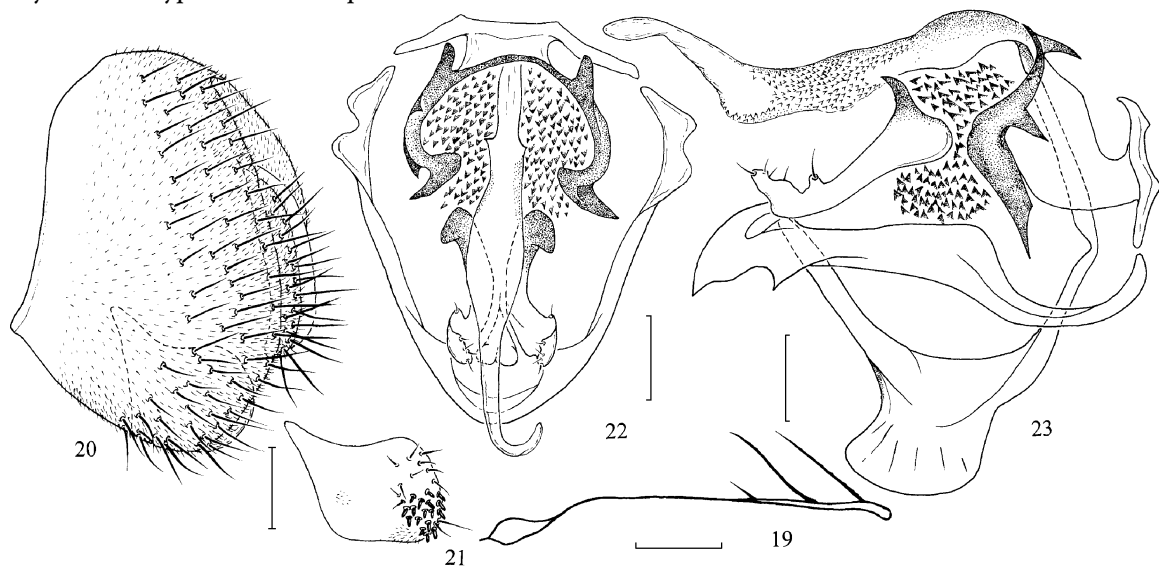
Diagnosis. Vertical process of gonopods strongly sclerotized on anterior margin, forming continuous arch (Figs. 22-23); aedeagal outer membrane with numerous spinules (Figs. 22-23).

Description. Male. Arista apically expanded, with two to three dorsal branches (Fig. 19).

All tibiae without dark rings; foreleg fifth tarsomere with one long seta apically.

Third to fifth abdominal sternites longer than wide, without long setae laterally; sixth sternite without long setae laterally.

Male terminalia. Surstylus with several setae and pubescence, numerous prensisetae on distal margin to inner surface (Fig. 21). Gonopods semiannular, distally with two processes, basally with one pointed process per side (Figs. 22-23). Paramere apically hooked and smooth, basally with four to five sensilla (Figs. 22-23). Aedeagus lacking median rod.



Figs 19-23. *Phortica spinosa* CHEN et Gao, *sp. nov.* ♂. 19. Arista. 20. Epandrium and cercus (lateral view). 21. Surstylus (inner view). 22. Hypandrium, parameres, aedeagus and gonopods (ventral view). 23. Hypandrium, paramere, aedeagus and gonopods (lateral view). Scale bars= 0.1 mm.

Measurements. BL= 3.94 mm in the holotype (range in 5 ♂♂ paratypes: 3.00-4.06 mm), ThL= 1.89 mm (1.44-1.90 mm), WL= 3.13 mm (2.40-3.00 mm), WW= 1.31 mm (1.00-1.32 mm).

Indices.  $arb = 2/0$  (2-3/0),  $adf = 1.20$  (1.00-1.20),  $flw = 1.30$  (1.20-1.30),  $FW/HW = 0.35$  (0.35-0.40),  $ch/o = 0.08$  (0.07-0.09),  $prorb =$

$1.15$  (1.18-1.25),  $rcorb = 0.55$  (0.50-0.60),  $vb = 0.50$  (0.40-0.50),  $dcl = 0.50$  (0.50-0.55),  $prescl = 0.85$  (0.85-0.90),  $sctl = 1.00$  (1.00-1.05),  $sterno = 0.90$  (0.85-1.00),  $orbito = 1.90$  (1.80-2.00),  $dcp = 0.22$  (0.20-0.25),  $sclp = 1.30$  (1.10-1.30),  $C = 2.88$  (2.11-2.41),  $4c = 1.14$  (1.39-1.58),  $4v = 2.50$  (2.50-2.85),  $5x = 1.00$  (1.00),  $ac = 3.20$

(3.40-3.80),  $M = 0.57$  (0.58-0.62),  $C3F = 0.69$  (0.63-0.74).

Holotype ♂, China, Yunnan, Simao, Yixiang (22.47° N, 101.02° E; alt. 1400 m), 15 Sep. 2002, CHEN Hong Wei (SCAU).

Paratypes. China, 4 ♂♂, same data as holotype (SCAU); 10 ♂♂ same data as holotype except for 8 Nov. 2001, WATABE Hide-aki (2 ♂♂, PKU; 4 ♂♂, KIZ; 4 ♂♂, SEHU); 2 ♂♂, Yunnan, Kunming, Jiaoye Park (25°02' N, 102°43' E; alt. 1900 m), 27 Apr. 2002, GAO Jiar-Jun (KIZ); 2 ♂♂, Yunnan, Xishuangbanna, Menglun (21°41' N, 101°25' E; alt. 900 m), 24-26 Dec. 2003, WEN Shuo-Yang and CHEN Hong Wei (SCAU); Hainan, Ledong, Jianfengling (18°41' N, 108°52' E; alt. 700 m), 4 ♂♂, 18-20 May 2004, CHEN Hong Wei (SCAU); 6 ♂♂, 23 Sep. 1993, Toda Masanori J. (GIE). Myanmar: 1 ♂, Pyinoolwin, 30 Dec. 1981-6 June 1982, Toda Masanori J. (SEHU).

Distribution. China (Hainan, Yunnan), Myanmar (Pyinoolwin).

Relationship. This species seems to resemble *P. nigrifoliiseta* in the shape of vertical process of

gonopods, but can be distinguished from the latter species by the distinct spinules on the aedeagal outer membrane (*P. nigrifoliiseta* having only minute warts).

Etymology. From the Latin word "spinus", meaning spines, referring to the numerous spinules on the aedeagal outer membrane.

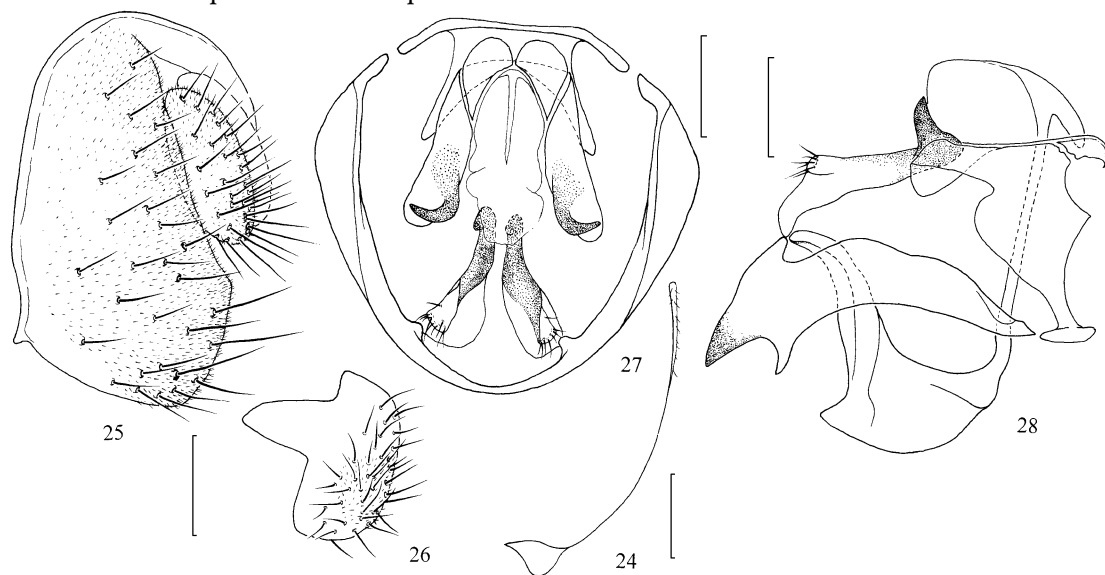
*Phortica symmetria* CHEN et TODA, sp. nov.  
(Figs. 24-28)

Diagnosis. Phallic organs (hypandrium, parameres, gonopods and aedeagus) completely symmetric (Fig. 27).

Description. Male. Arista apically expanded, without branches (Fig. 24).

All tibiae without dark rings; foreleg fifth tarsomere with one long seta apically. Third to fifth abdominal sternites broadened, shorter than wide, with several long setae laterally.

Male terminalia. Surstylus with numerous setae and pubescence, lacking prenisetae (Fig. 26). Paramere apically hooked and smooth, basally not recurved (Figs 27-28). Aedeagus with short median rod.



Figs. 24-28. *Phortica symmetria* CHEN et TODA, sp. nov. ♂. 24. Arista. 25. Epandrium and cercus (lateral view). 26. Surstylus (inner view). 27. Hypandrium, parameres, aedeagus and gonopods (ventral view). 28. Hypandrium, paramere, aedeagus and gonopods (lateral view). Scale bars= 0.1 mm.

Measurements. BL= 3.20 mm in the holotype (range in 3 ♂♂ paratypes: 3.15-3.23 mm), ThL= 1.20 mm (1.20-1.30 mm), WL= 2.20 mm (2.20-2.30 mm), WW= 1.00 mm (1.00-1.10 mm).

Indices arb= 0/0, flw= 1.10 (1.10-1.20), FW/HW= 0.45 (0.45-0.50), chl/o= 0.05 (0.05-0.06), prorb= 1.20 (1.20-1.30), rcorb= 0.55 (0.55-0.60), vb= 0.50 (0.50), dcl= 0.45 (0.45-

0.50), prescl= 0.55 (0.55-0.60), scl= 1.00 (1.00), sterno= 0.95 (0.95-0.98), orbito= 1.90 (1.90), dcp= 0.25 (0.25), sclp= 1.20 (1.20), C= 1.91 (2.23-2.38), 4c= 1.52 (1.62-1.67), 4v= 2.43 (2.35-2.58), 5x= 0.93 (1.00-1.17), ac= 3.80 (3.50-4.21),  $M = 0.59$  (0.53-0.70),  $C3F = 0.69$  (0.63-0.70).

Holotype ♂, China, Guangdong, Zhaoqing,



Dinghushan (23° 10' N, 112° 34' E; alt. 500 m), 3 Oct. 2003, CHEN Hong Wei (SCAU).

Paratypes. China, 3 ♂♂, same data as holotype (SCAU); 2 ♂♂, 1 ♀, same data as holotype except for 5-13 July 1986, 9-16 Nov. 1987, ex banana traps, PENG Tong Xu (GIE).

Distribution. China (Guangdong).

Relationship. This species is unique in having the completely symmetric phallic organs within this species complex.

Etymology. From the Greek word "symmetria", meaning symmetric, referring to the symmetric phallic organs.

*Phortica tanabei* **Chen and Toda, sp. nov.**  
(Figs. 29-32)

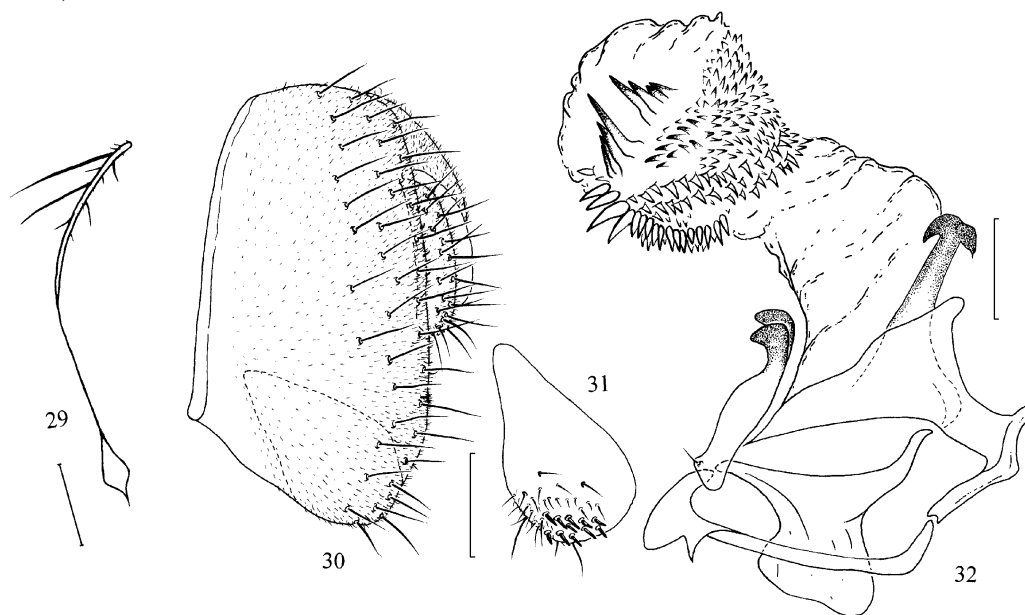
Diagnosis. Aedeagal median rod apically hooked, somewhat like anchor; outer membrane with numerous, weakly sclerotized, small triangle processes (Fig. 32).

Description. Male. Arista apically expanded, with two to three dorsal branches (Fig. 29).

All tibiae without dark rings; foreleg fifth tarsomere with one long seta apically.

Third abdominal sternite broadened, shorter than wide, with long seate laterally; fourth and fifth sternites slightly shorter than wide; sixth sternite without long setae laterally.

Male terminalia. Surstylus with several setae and pubescence, about 11 prenisetae on distal margin to inner surface (Fig. 31). Gonopods weakly sclerotized,



Figs 29-32. *Phortica tanabei* Chen et Toda, sp. nov. ♂. 29. Arista. 30. Epandrium and cercus (lateral view). 31. Surstylus (inner view). 32. Hypandrium, parameres, aedeagus and gonopods (lateral view). Scale bars= 0.1 mm.

without processes (Fig. 32). Paramere apically knobbed and finely serrated, basally with one sensillum but not recurved (Fig. 32).

Measurements. BL= 2.88 mm in the holotype (range in 6 ♂♂ paratypes: 2.52-3.10 mm), ThL= 1.28 mm (1.12-1.44 mm), WL= 2.20 mm (1.80-2.32 mm), WW= 1.00 mm (0.88-1.00 mm).

Indices. arb= 2.3/0 (2.3/0), adf= 1.10 (1.00-1.20), flw= 1.30 (1.10-1.50), FW/HW= 0.35 (0.33-0.35), ch/o= 0.07 (0.07-0.08), prorb= 1.30 (1.10-1.35), rcorb= 0.65 (0.55-0.65), vb= 0.50 (0.40-0.45), dcl= 0.50 (0.50-0.60), prescl= 0.55 (0.50-0.65), scl= 1.20 (1.00-1.20), sterno= 0.95 (0.90-1.00), orbito= 1.70 (1.50-1.80), dcp= 0.25 (0.21-0.23), sclp= 1.25 (1.20-

1.30), C= 1.81 (1.59-1.82), 4c= 2.00 (1.80-2.25), 4v= 3.25 (2.63-3.38), 5x= 1.40 (1.00-1.75), ac= 3.20 (3.40-4.25), M= 0.88 (0.67-0.88), C3F= 0.50 (0.50-0.59).

Holotype ♂, China, Guangdong, Conghua, Sanyatang Park (23° 40' N, 113° 34' E; alt. 500 m), 3 Nov. 2003, CHEN Hong Wei (SCAU).

Paratypes. China, 3 ♂♂, same data as the holotype (SCAU); 7 ♂♂, Guangdong, Yingde, Shimertai (24° 25' N, 113° 17' E; alt. 700 m), 9, 10 Apr. 2004, CHEN Hong Wei (2 ♂♂, PKU; 5 ♂♂, SCAU); 1 ♂, Guangdong, Luyuan, Nanling (25° 10' N, 113° 00' E; alt. 1 000 m), 3 May 2004, CHEN Hong Wei (SCAU); Hainan, Ledong, Jianfeng (18° 41' N, 108° 52' E; alt. 220-700 m), 4 ♂♂

18-20 May 2004, CHEN Hong-Wei (SCAU); 10 ♂♂, 23 Sep. 1993, Toda Masanori J. (GIE); Yunnan, Xishuangbanna, Menglun (21° 41' N, 101° 25' E; alt. 900 m), 3 ♂♂, 8 Mar. 2003, 5 ♂♂, 24-26 Dec. 2003, Toda Masanori J., WEN Shuo-Yang and CHEN Hong-Wei (5 ♂♂, KIZ; 3 ♂♂, SEHU). Myanmar, 2 ♂♂, Pyinoolwin, 30 Dec.-6 Jun. 1982, Toda Masanori J. (SEHU). Malaysia: Sabah, Mt. Kinabalu: 2 ♂♂, 27 Dec. 1998, 3 ♂♂, 2 Jun. 1999, 20 ♂♂, 1-23 Mar. 1999, 8 ♂♂, 1-10 Oct. 1999, 2 ♂♂, 7 Mar. 2000, Tanabe Shiro-ichi and Toda Masanori J. (12 ♂♂, ITBC; 11 ♂♂, KSPS; 12 ♂♂, SEHU); 1 ♂, Sabah, Crocker Range, 16 Oct. 1999, Toda Masanori J. (KSPS).

**Distribution.** China (Guangdong, Hainan, Yunnan), Myanmar (Pyinoolwin), Malaysia (Sabah).

**Relationship.** This species resembles *P. foliacea* in the shape of vertical process of gonopods, but can be distinguished from the latter species by the diagnostic characters (in *P. foliacea*: aedeagal median rod not hooked apically; processes on aedeagal outer membrane strongly sclerotized, small, peg-like shaped).

**Etymology.** Patronym, in honor of Dr. S. Tarrabe of Kanazawa University, Japan.

**Key to species of the *Phortica foliiseta* species complex from China**

### Male

Interfrontal setae thick, dense; additional plate between cerci and 10th sternite absent; paramere short, rod shaped, apically mostly knobbed, usually with a few sensilla basally (*foliiseta* species complex) ..... 1

1. Arista not expanded apically; all tibiae with two dark rings; foreleg fifth tarsomere without long seta apically; vertical process of gonopods nearly symmetric, slightly sclerotized, with two small, sclerotized projections on apical margin .....  
..... *P. afoliolata* **Chen et Toda, sp. nov.**

Arista expanded apically; all tibiae without dark rings; foreleg fifth tarsomere with one long seta apically ..... 2

2. Surstylus with prensisetæ ..... 3  
Surstylus without prensisetæ ..... 6

3. Arista with two distinct, ventral branches submedially; hypandrium asymmetric; aedeagal outer membrane lacking spinules or processes .....  
..... *P. glabra* **Chen et Toda, sp. nov.**

Arista without distinct, ventral branches; hypandrium symmetric; aedeagal outer membrane with spinules or processes ..... 4

4. Vertical process of gonopods developed, nearly entirely sclerotized apically; aedeagus lacking median rod .....  
..... *P. spinosa* **Chen et Gao, sp. nov.**

Vertical process of gonopods small, nearly unsclerotized apically; aedeagal median rod present ..... 5

5. Aedeagal median rod apically hooked like anchor; paramere basally not recurved; aedeagal outer membrane with numerous, weakly sclerotized processes .....  
..... *P. tanabei* **Chen et Toda, sp. nov.**  
Aedeagal median rod apically not hooked; paramere basally recurved; aedeagal outer membrane with numerous, strongly sclerotized, peg-like

processes ..... *P. foliacea* (**Tsacas and Okada**)

6. Vertical process of gonopods completely symmetric .....  
..... *P. symmetria* **Chen et Toda, sp. nov.**

Vertical process of gonopods asymmetric ..... 7

7. Vertical process of gonopods triangular, with only one sclerotized process apically ..... 8  
Vertical process of gonopods constricted apically, with two sclerotized processes apically ..... 9

8. Arista with two dorsal branches basally; projections of vertical process of gonopods apically blunt ..... *P. speculum* (**Mica and Lin**)

Arista without distinct dorsal branches; projections of vertical process of gonopods apically pointed .....  
..... *P. brachychaeta* **Chen et Toda, sp. nov.**

9. Arista basally with one or two distinct dorsal branches; vertical process of gonopods sclerotized only apically, and anterior projection on right, lateral lobe of vertical process not bifurcated ... *P. foliiseta* **Duda**

Arista basally without distinct dorsal branches; vertical process of gonopods strongly sclerotized; anterior projection on right, lateral lobe of vertical process apically bifurcated .....  
..... *P. foliisetae* **Chen et Toda, sp. nov.**

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中国及周边国家的伏绕眼果蝇属叶芒绕眼果蝇复合种组研究（双翅目，果蝇科）

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摘 要 叶芒伏绕眼果蝇复合种组是 Tsacas and Okada, 1983 建立的，已报告有 6 种，均出自于东洋区。记述了采自于中国及周边国家的伏绕眼果蝇属叶芒伏绕眼果蝇复合种组的 10 个种，并附有分种检索表。端尖叶芒伏绕眼果蝇 *Phortica foliacea* (Tsacas et Okada, 1983)；叶芒伏绕眼果蝇 *Phortica foliiseta* Duda, 1923；侦测伏绕眼果蝇 *Phortica speculum* (Máca et Lin, 1993)；异叶芒伏绕眼果蝇 *Phortica afoliolata* Chen et

Toda, sp. nov.；短毛伏绕眼果蝇 *Phortica brachychaeta* Chen et Toda, sp. nov.；拟叶芒伏绕眼果蝇 *Phortica foliisæoides* Chen et Toda, sp. nov.；缺毛伏绕眼果蝇 *Phortica glabra* Chen et Toda, sp. nov.；刺伏绕眼果蝇 *Phortica spinosa* Chen et Gao, sp. nov.；对称伏绕眼果蝇 *Phortica symmetria* Chen et Toda, sp. nov.；田边氏伏绕眼果蝇 *Phortica tanabei* Chen et Toda, sp. nov.。

关键词 双翅目，果蝇科，伏绕眼果蝇属，新种。  
中图分类号 Q969. 462. 2